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Three new genera of Australian Astereae (Asteraceae)

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Abstract

Three new genera of Australian Asteraceae are described and illustrated. *Allittia* P.S.Short from south-eastern Australia contains two species, *A. cardiocarpa* (F.Muell. ex Benth.) P.S.Short *comb. nov.* and *A. uliginosa* (G.L.R.Davis) P.S.Short *comb. nov.*, which were previously included in *Brachyscome s. lat. Hullsia argillicola* P.S.Short, *gen. & sp. nov.* is endemic to northern Australia where it grows in seasonally inundated, clay soils. *Pembertonia* P.S.Short accommodates a species from Western Australia which until now has been known as *Brachyscome latisquamea* F.Muell.

Introduction

Contrary to the impression that may have been given in papers such as Watanabe *et al.* (1996) I believe that a number of genera should be segregated from *Brachyscome* Cass. *s. lat.* (Short 1999). Containing about 100 species it has been the dumping ground for Australian asteroid species that either lack a pappus of have a short crown of bristles or bristle-like scales. Species have been referred to *Brachyscome* with little consideration of other morphological and anatomical attributes and I have no doubt that segregate genera should be recognised.

With the view to gaining a thorough overview of the variation in Australian Astereae, something that is necessary if some consistency in generic concepts is to be reached, a large character set for approximately 200 species has been compiled. Preliminary cladistic analyses have also been carried out with a view to eventually presenting a conspectus of Australian genera, including *Brachyscome*. This work involved checking and scoring more than 150 potentially useful morphological and anatomical characters. However, whether this work will be finalised remains to be seen; problems with homoplasy, coding, time and even doubts as to whether cladistics really offers acceptable answers (e.g. Brummitt 2002) are some of the factors which may mean that the project remains incomplete. I also suspect that without resorting to molecular analyses there will continue to be doubts as to the circumscription of *Brachyscome* and some of the segregate genera I intend to recognise. Unfortunately the published work utilizing nucleotide sequences of the chloroplast gene *mat*K (Denda *et al.* 1999) has not been of assistance. Apart from the absence of many species from the analysis the relationships as elucidated by this molecular information are simply not supported by morphological and anatomical data. The separation into separate clades of members of the *B. lineariloba* DC. complex is a prime example. Similarly, I find it impossible to reconcile the placement of *B. latisquamea* F.Muell., a species I here place in the monotypic genus *Pembertonia*, with *B. halophila* P.S.Short and *B. ciliocarpa* W.Fitzg. No reasons were given but Watanabe (pers. comm.) has, since publication, also described the data from restriction site analysis of chloroplast DNA (Watanabe *et al.* 1996) as being "no good". Most certainly, as with *mat*K results, the relationships suggested by the chloroplast DNA analyses are sometimes at extreme variance to those indicated by morphological and anatomical data and again there is inadequate sampling of species, with members of the *B. aculeata* (Labill.) Cass. ex Less. complex (i.e. *Brachyscome s. str.*) not included.

From having surveyed numerous species and characters it is evident that there will need to be considerable realignment of many taxa, not just those in *Brachyscome s.lat.* but also in both *Minuria* DC. and *Olearia* Moench. which are clearly not monophyletic genera.

Both the completion of a single major revision of *Brachyscome s.lat.* and the

finalization of a large cladistic analysis of Australian Astereae have become somewhat unrealistic tasks, or at least tasks that cannot be readily completed in a short time. I have therefore decided that it is best to publish some of the segregate genera that I now recognise in a series of papers when a revision of the component species of each genus is completed.

In this paper I formally describe three new genera, the ditypic genus *Allittia* to accommodate *B. cardiocarpa* F.Muell. ex Benth. and *B. uliginosa* G.L.R.Davis, and the two monotypic genera, *Hullsia* and *Pembertonia*. The last genus incorporates the species currently known as *B. latisquamea* while *Hullsia* accommodates a previously undescribed species.

Taxonomy

Allittia P.S.Short, *Gen. nov.*

Herbae perennes sine rhizomatibus plerumque foliis basalibus. *Folia* integra vel pinnatisecta lobis 1–6 plerumque glabra sed foliis infernis cum pilis longis grossis septatis subbruneis basibus. *Scapi* foliis paucis, scapo florenti quam foliis longiore. *Capitula* solitaria heterogama radiata. *Bracteae* involucri in seriebus duabus distinctis, marginibus scariosis glabris. *Receptaculum* convexum vel aliquantum conicum glabrum alveolatum. *Flosculi radii* feminei, corolla alba vel subcyanea. *Flosculi disci* bisexuales corolla lobis 5, lutea. *Stamina* 5 antheris cum appendici. *Stylus* appendicibus sterilibus apicalibus deltatis vel triangularibus atque longitudine partem stigmaticam aequantibus vel ea brevioribus. *Cypselae* homomorphae tenues bruneae concolores corpore fructus laevis vel minute tuberculato, cristis longitudinibus atque exterioribus aliformibus, glabris; extensiones aliformes marginibus integris vel incisuris indistinctis, margines pilis biseriatis eglandulatis curvatis vel apicibus vix involutis, carpopodium adest. *Pappus* setis 10–15 squamiformibus erectis.

Typus: *Allittia cardiocarpa* (F.Muell. ex Benth.) P.S.Short.

Perennial, non-rhizomatous, tufted (scapiform) herbs with mostly basal leaves. *Leaves* entire or pinnatisect and with 1–6 lobes, mainly glabrous but at least the lower leaves with long, coarse, septate, brownish hairs at the base. *Scapes* with some leaves which reduce in length up the scape, the flowering scape longer than the leaves. *Capitula* solitary, heterogamous, radiate. *Involucral bracts* in c. 2 distinct rows, margins scarious, glabrous. *Receptacle* convex or somewhat conical, glabrous, alveolate. *Ray florets* female. *Ray corolla* white or bluish. *Disc florets* bisexual; corolla 5-lobed, yellow. *Stamens* 5, anthers with an apical appendage. *Style* with sterile apical appendages shortly deltate or triangular and about the length or shorter than the stigmatic portion. *Cypselas* homomorphic, thin, brown, concolorous; fruit body smooth or minutely tuberculate and barely to well-defined by longitudinal ridges associated with the vascular traces, glabrous; non-vascular longitudinal ridges absent; wing-like extensions not swollen and with entire or barely notched edges, the edges with biseriate, eglandular, curved or sometimes slightly inrolled hairs; carpopodium present. *Pappus* of c. 10–15 scale-like, somewhat erect bristles which are connate or barely so at the base, the bristles to c. 0.4 mm long. *Chromosome number*: $x = 9$.

Distribution: South-eastern, mainland Australia and Tasmania.

Etymology: The name commemorates William Allitt. He collected herbarium specimens, including the new lectotype specimen of *Brachyscome cardiocarpa*, in the south-west of Victoria while he was curator of the botanic gardens at Portland from the 1860s to the 1880s (Willis 1949).

Notes: Both species of *Allittia* have laterally compressed, thin cypselas, which is characteristic of a number of other species in *Brachyscome s. lat.*, but they differ from

these other species by having long, coarse, septate, brownish hairs at the base of the leaves. The fact that they are non-rhizomatous, tufted, perennial herbs also distinguishes them from other species of *Brachyscome s. lat.* with thin cypselas.

Immature fruit of *A. cardiocarpa* and sometimes mature fruit of *A. uliginosa* may exhibit two longitudinal ridges on each lateral face. Cleared fruit show that these ridges are associated with vascular traces in the pericarp and as such they are not considered to be homologous with the longitudinal ridges found in some other species of *Brachyscome s. lat.*

Key to Species

1 Leaves usually entire, to 30 cm long, 0.1–0.3 cm wide, rarely with several linear lobes ..... ***A. cardiocarpa***

1: Leaves entire or pinnatisect, the latter common and with 1–6 lobes, all leaves to c. 11 cm long, (0.2) 0.4–1.4 cm wide ..... ***A. uliginosa***

Allittia cardiocarpa (F.Muell. ex Benth.) P.S.Short, *comb. nov. Brachyscome cardiocarpa* F.Muell. ex Benth., *Flora austral.* 3: 517 (1867) ("*Brachycome*"). Type citation: "Victoria. Swamps of Gipps' Land, *F. Mueller*; Heaths, Glenelg River, *Robertson*; Portland, *Allitt*. Tasmania. Mount Wellington, Formosa, etc., generally growing in water, *J. D. Hooker* and others. S. Australia. Rivoli Bay, *C.*[sic] *Mueller*." Lectotype (*lecto nov.*, here chosen): Portland, *W. Allitt 5* (MEL 220866), see below. Remaining syntypes: Glenelg [River], *Anon.*, presumably Robertson (K); Rivoli Bay, Oct. 1848, *F. Mueller* (MEL 220867); swamps of Gippsland, *?F. Mueller*, (K). Unciled specimens or duplicates of specimens seen by Bentham: South Esk, Tasmania, 10 Dec., *C. Stuart 114* (MEL 220868); Swamps near Perth, Tas., Dec. 1849. *C. Stuart* (MEL 220869); Van Diemen's Land, *C. Stuart* (MEL 220865, MEL 220870, both ex herb. Sonder).

[*Brachyscome linearifolia* auct non DC., Hook.f., *Flora Tasman.* 1: 185 (1856).]
Perennial herb, erect, to 45 cm tall, mainly glabrous, basally surrounded by bases of former leaves. *Leaves* mainly radical, linear, usually entire, 4–30 cm long 0.1–0.3 cm wide, very rarely with several small linear lobes, mainly glabrous but at least the lower leaves with long, coarse, septate, brownish hairs at the base. *Scapes* sometimes shorter but usually longer than the leaves, with some linear leaves which reduce in length towards the capitulum. *Involucre* c. 8–15 mm diam.; bracts c. 40–48, in at least 2 distinct rows, somewhat oblong or obovate to oblanceolate, 4–8.8 mm long, 0.8–3.1 mm wide, glabrous. *Receptacle* subconical, glabrous, alveolate. *Ray florets* 54–77; corolla 10.6–16.2 mm long, apically not lobed or barely 2-lobed, with (3) 4 or 5 (6) veins, white or mauve. *Disc florets* 150–226; corolla tube 5-lobed, 2.8–3.7 mm long, yellow. *Stamens* 5; anthers 1.4–1.93 mm long; microsporangia 1.1–1.5 mm long; apical appendage 0.26–0.43 mm long. *Pollen grains* c. 3700–4600 per floret. *Style* with sterile apical appendages triangular and slightly longer than the stigmatic portion. *Cypselas* widely obovate to obovate, 2.4–3.4 mm long, 1.8–2.3 mm wide, brown, concolorous or discolorous, with the wing-like margins paler than the fruit body; fruit body smooth or minutely tuberculate and not or more or less well-defined by longitudinal ridges associated with the vascular traces, glabrous or each tubercle with a hair; wing-like margins non-swollen and with entire edges, the edges with biseriate, curved, eglandular hairs. *Pappus* of c. 10 scale-like, more or less erect bristles 0.1–0.4 mm long, connate at the base, not exceeding the apical notch of the cypsela. *Chromosome number*: $n = 18$. (Fig. 1, a–g).

Distribution: South-east South Australia, much of Victoria, extreme south-east of New South Wales, and Tasmania. I have not seen specimens from New South Wales but the illustration and description of *A. cardiocarpa* in Everett (1992, p. 165) are of this species.

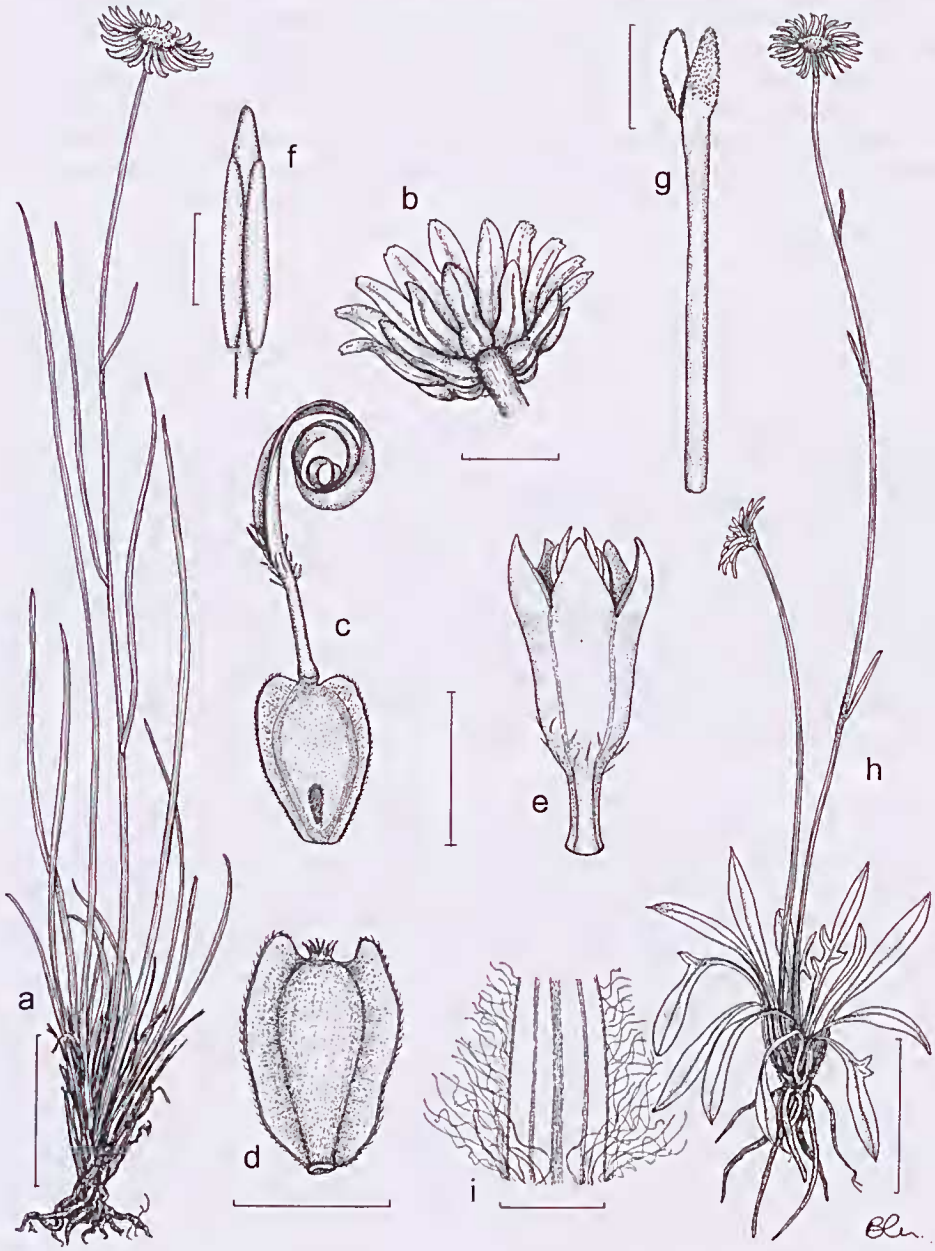

Figure 1. a–g. *Allittia cardiocarpa*. **a.** habit (*Moscal 3490*, *Short 3238*); **b.** involucre showing two rows of bracts (*Short 3238*); **c.** ray floret with immature ovary, the pappus not visible (*Short 3238*); **d.** mature fruit (*Short 3919*); **e.** disc corolla (*Short 3238*); **f.** anther (*Short 3238*); **g.** style, showing stigmatic portion and externally papillate appendage (*Short 3238*). **h–i.** *Allittia uliginosa*. **h.** habit (*Albrecht 2799*); **i.** base of leaf showing characteristic coarse hairs (*Albrecht 2799*). Scale bars: a, h = 3 cm; b = 5 mm; c, d, e, i = 2 mm; f, g = 0.5 mm.

Habitat: Grows in swampy areas, plants often being partly immersed in water, and commonly associated with sedges. Collections from near coastal regions suggest that it may have some tolerance to salinity.

Chromosome Number: A chromosome number of $2n = 36$ was reported by Watanabe *et al.* (1996) from two populations in south-west Victoria, indicating that the species is a tetraploid. Reports by Smith-White *et al.* (1970) of $2n = 18$ for a population of this species at Callemondah (A.C.T.) are erroneous. There are no other other records indicating that the species occurs there and the only vouchered specimens of *Brachyscome s. lat.* at SYD collected by Smith-White and his colleagues from this locality are of *Brachyscome scapigera* (Spreng.) DC.

Flowering Period & Reproductive Biology: Mostly flowers from about September to January but flowering specimens have been collected in other months. That the species commonly outcrosses is indicated by the large capitula and an average pollen:ovule ratio of 4286, determined from a single population, *Short 3238*.

Typification: Bentham did not specifically cite all specimens he examined when naming *B. cardiocarpa*, indicating by use of "etc." that he had seen collections from different localities in Tasmania and that they had been gathered by various collectors ("and others"). Davis (1948, p. 196) subsequently recorded that "specimens annotated by Mueller (South Esk River, 10.12.1849, C. Stuart) were nominated lectotype and lectoparatype ...". As will be evident from determinavit slips accompanying specimens at MEL I initially accepted Davis's choice of lectotype, believing that Bentham's broad reference in the protologue to unspecified collections from various localities in Tasmania, meant that, following Art. 9.17, the choice of Stuart's collection was not "in serious conflict with the protologue". However, Art. 9.10 states that a lectotype should be chosen from an isotype "if such exists, or otherwise a syntype if such exists [and] ... if no cited specimens exist ... from among the uncited specimens". Although there is no doubt that Bentham saw Stuart's collection it must be deemed to be an "uncited specimen", not a syntype specimen. I have therefore chosen a syntype specimen, "Portland, *Allitt*", as the new lectotype of the name *Brachyscome cardiocarpa*.

Selected Specimens: SOUTH AUSTRALIA: Mary Seymour Conservation Park, 13 Oct. 1982, *N.N. Donner 9301* (AD); VICTORIA: c. 6.5 km W of Poolaijelo, 27 Sept. 1988, *P.S. Short 3238* (MEL); c. 4 km ESE of Dundonnel, 8 Oct. 1991, *N.G. Walsh 3112* (MEL); TASMANIA: Wineglass Bay, beside lagoon behind the beach, 21 Nov. 1981, *A.M. Buchanan 626* (HO).

Allittia uliginosa (G.L.R.Davis) P.S.Short, *comb. nov. Brachyscome uliginosa* G.L.R.Davis, *Proc. Linn. Soc. New South Wales* 79: 203, figs 1–4 (1955). Type citation: "*Holotype*: Heathland at eastern foot of Black Range, Western Grampians Region, Victoria, 2.11.1948, J. H. Willis (MEL). Paratypes: Two. *Loc. cit.* (MEL)." Holotype: Heathland swamp at eastern foot of Black Range (near "The Pass", 3 miles NE of Mt Byron Trig), western Grampians region, Vic., 2 Nov. 1948, *J. H. Willis* (MEL 220486 *p.p.*). Isotypes: MEL 220486 *p.p.*(excluding holo.), MEL 220487 *p.p.* (excl. St John specimen).

Perennial herb, erect, to 35 cm tall, mainly glabrous, basally surrounded by leaf bases of former leaves. *Leaves* mainly radical, oblanceolate, entire, 2–11 cm long, (0.2) 0.4–1.4 cm wide, or pinnatisect with 1–6 lobes, mainly glabrous but at least the lower leaves with long, coarse, septate, brownish hairs at the base. *Scapes* when flowering longer than the leaves, with some oblanceolate or almost linear leaves which reduce in length toward the capitulum. *Involucre* c. 5–8 mm diam.; bracts 21–40, in c. 2 distinct rows, obovate, 2.5–4.6 mm long, 1.1–2.1 mm wide, glabrous. *Receptacle* convex, glabrous, alveolate. *Ray florets* 30–54; corolla 5.4–9.1 mm long, 1–1.9 mm wide, barely 3-lobed, with 4 veins, white or bluish. *Disc florets* 37–88; corolla tube 5-lobed, 1.8–2.7 mm long, yellow.

Stamens 5; anthers 1.04–1.32 mm long; microsporangia 0.83–1.05 mm long; apical appendage 0.18–0.29 mm long. *Pollen grains* c. 2000–3600 per floret. *Style* with sterile apical appendages shortly deltate and shorter than the stigmatic portion. *Cypselas* widely obovate, 1.5–2 mm long, 1.2–1.4 mm wide, brown, concolorous; fruit body smooth and more or less well-defined by longitudinal ridges associated with the vascular traces, glabrous; wing-like margins non-swollen and with entire or barely notched edges, the edges with biseriate, curved, eglandular hairs or sometimes the apices of the hairs slightly inrolled. *Pappus* of c. 10–15 scale-like, somewhat erect bristles 0.2–0.4 mm long, barely (or not?) connate at the base, usually exceeding the often barely formed apical notch formed by the wings. *Chromosome number*: $n = 9$. (Fig. 1, h–i).

Distribution: Southern Victoria, extending west from the Dandenongs to areas such as the Brisbane Ranges, Mt Langi Ghiran, the Grampians, and beyond to south-eastern South Australia, including Kangaroo Island.

Habitat: Often in inundated *Eucalyptus* woodland, swamps and wet heathland but sometimes in drier rocky areas in sclerophyll forest. When observed at the same locality (*Short 3237 & 3238*) as its congener this species was growing on the edge of a swamp dominated by *Chorizandra cymbaria* R.Br. and extended into surrounding heathland but *A. cardiocarpa* was growing in the swamp.

Chromosome Number: A chromosome number of $n = 9$ was recorded by Smith-White *et al.* (1970) from plants (e.g. *S. Smith-White & C.A. Carter 4660*, SYD) from the Black Range, Grampians, Victoria.

Flowering Period and Reproductive Biology: Flowering has been recorded for Sept.–Nov. and June. The prominent capitula indicate that plants are cross-pollinated but an average pollen:ovule ratio of 1586, determined from *Short 3237*, is not particularly high for species with such large capitula, suggesting that plants may be self-compatible.

Conservation Status: Widespread and not regarded as endangered or vulnerable.

Selected Specimens: SOUTH AUSTRALIA: Karatta, c. 20 km W of Vivonne Bay, Kangaroo Island, 9–17 Nov. 1886, *Anon 118* (AD 97411131); Hundred of Coles, 30 km SW of Naracoorte, 19 Sept. 1963, *D. Hunt 1607* (AD); VICTORIA: c. 3.5 km due SE of Gotons Gorge, 10 Sept. 1986, *D.E.Albrecht 2826* (MEL); ½ mile N of Dergholm to Penola road, immediately E of Vic./S.A. border, 9 Nov. 1964, *A.C Beauglehole 19845* (MEL).

Hullsia argillicola P.S.Short, *Gen. & sp. nov.*

Brachyscome A58350 Newcastle Waters Station, Dunlop *et al.*, Checkl. Vasc. Pl. N. Territory, Australia 21 (1995); Albrecht *et al.*, Vasc. Pl. Checkl. S. Bioreg. N. Territory 66 (1997).

Herba perennis, subsucculenta, radice palari. *Axes majores* ascendentes ad erecti, 15–100 cm longi, cavi, striati, glabri, subglauci. *Folia* alterna sessilia, integra anguste elliptica vel linearia, apicibus acutis, 3–10 cm longa, 0.2–0.9 cm lata, subglauca et subsucculenta, folium omne costa prominenti et costis duabus lateralibus prominentibus. *Capitula* solitaria, heterogama, radiata. *Involucrum* c. 8–12 mm diametro. *Bracteae* multiseriatae, inequales, ovatae usque lanceolatae, ellipticae vel lanceolatae, 2.8–3.5 mm longae, 0.5–0.8 (1.2) mm latae; costa divisa et basi costa singulari cartaginae crescit; margines bractearum anguste hyalini; bracteae totae glabrae vel pilis minutis glanduliferis ad margines dispersis, eae post fructificantes valde reflexae. *Receptaculum* planum sed ubi bracteae reflexae apparenter concavum, epaleatum. *Flosculi radii* feminei, plures seriati, c. 140–180; corolla 5.5–7 mm longa, 0.7–0.9 mm lata, venarum 3 vel 4, apicibus brevibus lobis 2 vel 3, alba. *Flosculi disci* masculi, c. 100–150. *Corolla disci* flava; tubus 2.5–3.5 mm longus, distincto limbo, pagina exterior pilis biseriatis; lobi 5, 0.7–1.1 mm longi. *Stamina* 5; antherae 1.6–2 mm longae, ecaudatae, breviter calceratae, unaquaeque appen-

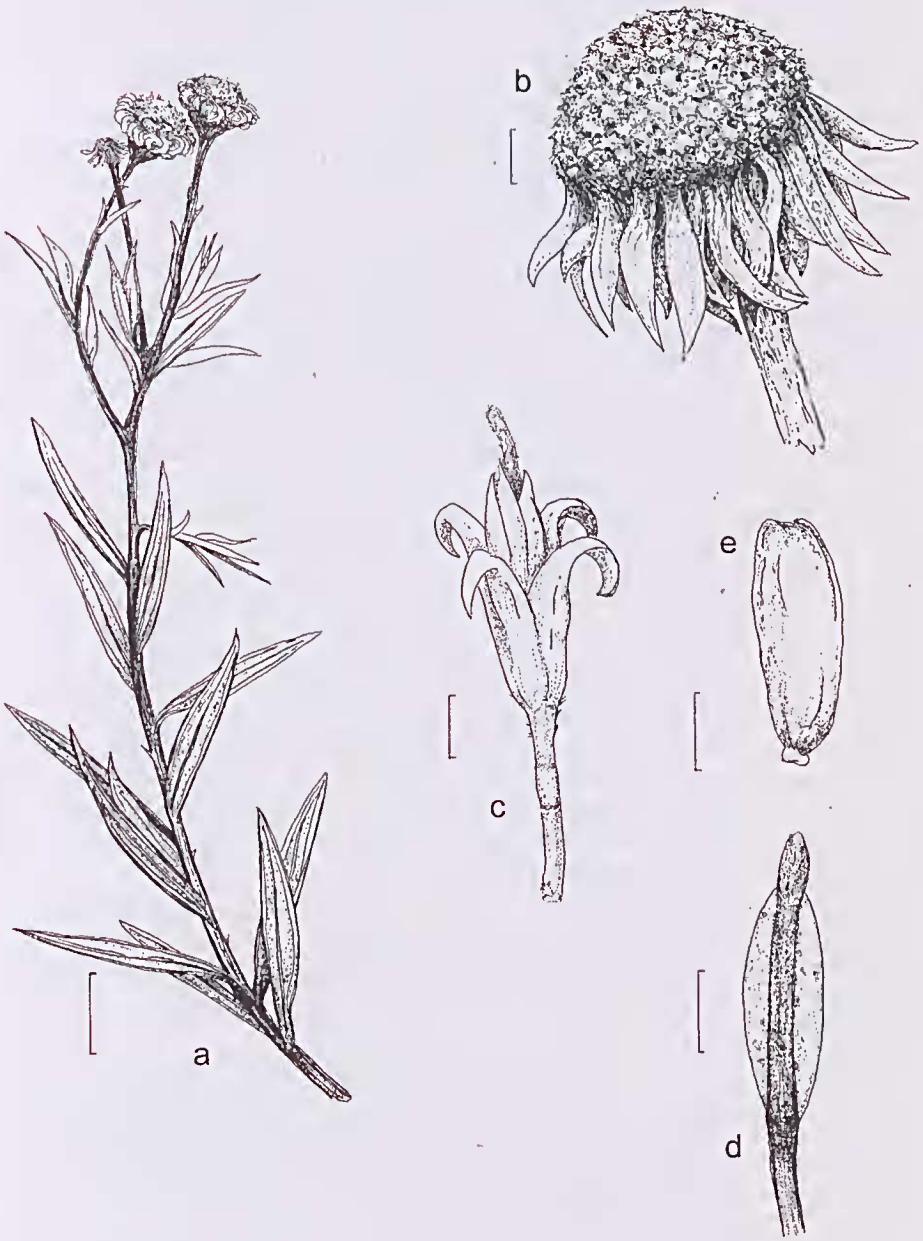

Figure 2. *Hullsia argillicola*. **a.** habit (*Wardell-Johnson 23*); **b.** mature capitulum showing receptacle (*Risler 445*, holo.); **c.** male disc floret with the sterile style and anthers visible (*Risler 445*, holo.); **d.** anther with sterile apical appendage (*Latz 6012*); **e.** mature cypsela showing the annular carpopodium (*Risler 445*, holo.). Scale bars: a = 2 cm; b = 1 mm; c, e = 1 mm; d = 0.5 mm.

dicula apicali sterili; microsporangia 1.1–1.4 mm longa, contextus in endothecio radiale incrassatus; appendiculis apicalibus plus minusve triangularibus, 0.33–0.45 mm longis, cellulae radiate incrassatae; collum fili plus minusve in ambitu rectum. *Stylus* breviter bilobatus ad apicem. *Cypselae* homomorphae, laterale complanatae, obovatae, 2.7–3.1 mm longae, 1–1.4 mm latae, glabrae, laeves, leviter viscidae, brunneae; carpopodium annulare, c. 0.5 mm latum; pericarpii sclerenchyma in fasciculis vascularibus restrictum; facibus vascularibus 2; testa cellulis manifeste incrassata. *Pappus* absens.

Holotypus: Alexandria Station, 1 km SW of No. 16 Bore, 19°15'27"S, 136°38'19"E., 19 July 2000, *J. Risler 445 & R. A. Kerrigan* (DNA D0142120). *Isotypi*: AD, BRI, CANB, K, MEL, MO, NSW, PERTH, S.

Perennial herb, subsucculent, with a well-developed tap root, may possibly sucker. *Stem* and branches ascending to erect, 15–100 cm long, hollow, striated, glabrous, somewhat glaucous. *Leaves* alternate, sessile, entire, narrowly elliptic or linear, apex acute, 3–10 cm long, 0.2–0.9 cm wide, somewhat glaucous and succulent, with a prominent mid-vein and with two prominent lateral mid-veins extending from the base. *Capitula* solitary, heterogamous, radiate. *Involucre* c. 8–12 mm diam. *Bracts* multiseriate and in rows of unequal length, ovate to lanceolate, elliptic or lanceolate, 2.8–3.5 mm long, 0.5–0.8 (1.2) mm wide; stereome divided and basally with a single main vein, becoming cartilaginous; margins narrowly hyaline; entire bracts glabrous or with scattered, minute, glandular hairs on the margins, the bracts strongly reflexed after fruiting. *Receptacle* flat but becoming concave when bracts reflex, epaleate. *Ray florets* female, several seriate, c. 140–180 per capitulum; corolla 5.5–7 mm long, 0.7–0.9 mm wide, 3- or 4-veined and apically shortly 2 or 3-lobed, white. *Disc florets* male, c. 100–150 per capitulum. *Disc corolla* yellow; tube 2.5–3.5 mm long, with a distinct limb, externally with biseriate hairs; lobes 5, 0.7–1.1 mm long. *Stamens* 5; anthers 1.6–2 mm long, ecaudate, shortly calcerate, each with a sterile apical appendage; microsporangia 1.1–1.4 mm long, endothecial tissue radially thickened; apical appendage more or less triangular, 0.33–0.45 mm long, the cells with radial thickening; filament collar more or less straight in outline. *Style* shortly bilobed apically. *Cypselas* homomorphic, laterally flattened, obovate, 2.7–3.1 mm long, 1–1.4 mm wide, glabrous, smooth but slightly viscid, brown; carpopodium annular, c. 0.5 mm wide; pericarp sclerenchyma restricted to the vascular bundles; vascular bundles in pericarp 2; testa cells with prominent u-shaped thickening. *Pappus* absent. (Fig. 2).

Distribution: Confined to northern Australia, with all but one collection from the Northern Territory (between 17° and 21° S). The remaining collection is from Kununurra, Western Australia. Within the N.T. it has been collected at Birrindudu Station near the W.A. border but otherwise all specimens are from the Barkly Tablelands and adjoining country.

Habitat: The species is recorded from heavy clay soils in seasonally inundated regions, e.g. *Eucalyptus microtheca* F.Muell. swamps, perennial tussock grassland with scattered coolibah, and cracking clay plains dominated by annual herbs and grasses. The type specimen, from a heavily grazed paddock, was associated with a species of *Panicum*, *Cullen cinereum* (Lindl.) J.W.Grimes, *Goodenia straugfordii* F.Muell., *Haloragis glauca* Lindl. and *Teucrium integrifolium* F.Muell. ex Benth.

Reproductive Biology: This is a monoecious species. A pollen:ovule ratio of 5577 was determined from *Latz 6012* for a single capitulum with 143 female florets and 136 male florets. This value is indicative of a high degree of, and perhaps obligatory, outcrossing. Cross-pollination is presumably enhanced by the fact that anthers are almost totally exserted from the corolla tube at anthesis.

Etymology: The generic name commemorates an early Top End collector with the surname of Hulls, a person who in Bentham's *Flora australiensis* is accredited with having gathered no fewer than 27 collections from Escape Cliff and 11 from Adam Bay. These

included syntype specimens of at least nine specific or infraspecific names. As far as I can ascertain the collector was Charles Hulls (his surname in *Flora australiensis* sometimes spelt as "Hulse" or "Hullse") who was a member of John McKinlay's party which in 1866 unsuccessfully attempted a journey from Escape Cliff to the Liverpool River (Lockwood 1995).

The specific epithet is in reference to the clay soils in which the species grows.

Conservation Status: Following the IUCN Red List Categories Version 3.1 the species is currently ranked in the N.T. as "Data Deficient".

There are 11 collections from the Barkly Tableands and adjacent areas and this suggests that the species is reasonably common. However, on a handwritten and unsigned note that accompanies *Henshall 2686* it is recorded that analyses showed the plant to have a percentage Dry Matter Digestibility (DMD) of 72.5%, a phosphorous content of 0.25% and a crude protein level of 17.1%. The DMD is an estimate of a plant's ability to supply energy and the high rate obtained is consistent with a further annotation on the same specimen that the species is heavily grazed by cattle. It was also noted that plants at the type locality were eaten by livestock (Kerrigan & Risler, pers. com.). Thus, its long-term survival may be dependant on excluding cattle from some populations.

Notes: Early collections of *Hullsia* were referred to the genus *Brachyscome*, in particular to *B. basaltica*, a species to which it bears a superficial resemblance. Its referral to the genus reflects the fact that there has been a common practice since Bentham (1867) to simply refer herbaceous members of the Astereae with no pappus, or an apparently reduced pappus, to *Brachyscome* with little consideration of other characters.

Hullsia argillicola is distinguished from all members of *Brachyscome s. lat.* by the possession of male, not bisexual, disc florets, and from most species by the multiseriate involucre of bracts, the bracts being manifestly of different lengths, not of equal length. The combination of entire leaves and erect habit are features which suggest affinities with *B. basaltica*. It not only differs from that species in the aforementioned characters of the disc florets and bracts but also in cypsela morphology; in *B. basaltica* they are tuberculate and have biseriate curved hairs.

The possession of male disc florets suggests affinities with genera such as *Calotis*, *Lagenophora*, *Minuria* and *Soleirogyne*. It is readily distinguished from *Calotis* which, along with *Erodiophyllum* and perhaps *Achnophora* and *Ceratogyne*, seem to form a discrete group within the Australian Astereae that is characterised by having fruit with pericarpic appendages. Such appendages superficially look like, and are usually, but erroneously, described as pappus elements. Affinities with species currently included in *Minuria*, undoubtedly not monophyletic, seem to be remote. All species in *Minuria s. lat.* are characterised by the possession of pappus bristles and have different fruit morphologies. Affinities with *Lagenophora* and *Soleirogyne*, in which the species are stoloniferous scapose or scapiform herbs, also seems to be remote.

The species has a well-developed tap root and although some plants seen by me are relatively small there is no doubt that *H. argillicola* is a perennial.

Specimens Examined: WESTERN AUSTRALIA: Ord Irrigation Area Block 111, in Kununurra clay; 23 July 1980, *I. Wardell-Johnson 23* (DNA, 2 sheets); NORTHERN TERRITORY: Helen Springs, 300 m W of no. 14 bore, 13 May 1999, *C. Brock 27* (DNA); Birrindudu Station, 18 June 1994, *J.L. Egan 4247* (DNA); Brunchilly Station, 5km E of 13 bore, 13 March 1979, *T.S. Henshall 2578* (AD, DNA, MEL, PERTH); Newcastle Waters Station, 7 km E of no. 7 bore, 14 March 1979, *T.S. Henshall 2583* (DNA, MEL); Anthony's Lagoon Station, 9 km S of Beef Road crossing, 18 March 1979, *T.S. Henshall 2686* (CANB, DNA, NSW); A-bore, Newcastle Waters Station, 31 May 1975, *P.K. Latz 6012* (AD, DNA); Kennedy Creek, 84 km N of Barkly Hmsd, 9 Sept. 1995, *P.K. Latz 14538* (DNA, NT); Coolabah Bore, Mittibah Station, 17 July 2001, *C.P. Mangion 1521 & J.A. Risler* (DNA, NT); Avon Downs, 2 km N of no. 24 Bore, 1 Aug. 2001, *J. Risler 1057 & A. Duguid* (DNA, NT); No. 18 Bore, Mungabroom Station, 27 Aug. 1987, *B.W. Strong 1032* (DNA); Brunchilly Station, 15 Feb. 1979, *L. Ulyatt 112* (BRI, DNA).

Pembertonia P.S.Short, *Gen. nov.*

Brachyscome sect. *Heteropholis* F.Muell., Fragm. 11: 16 (Mar. 1878), *nom. inval.*

Planta frutex perennis scandens glaber. *Folia* alterna, sessilia, integra, plerumque linearia vel lineo-oblanceolata vel lineo-elliptica sed nonnihil curvata, viridia, subsucculenta. *Capitula* solitaria, heterogama, radiata; bracteae involucri in verticillis duobus imbricatae herbaceae, bracteae externae valde convexae quam illae planae vel convexae verticilli interni breviores, bracteae omnes glabrae venis 4–8 e basibus. *Receptaculum* convexum epaleatum glabrum. *Flosculi radii feminei*, corolla plerumque alba vel rosea raro submalvina vel subpurpurea; pars tubularis pilis biseriatis glandulis; ligula venis lobis indistinctis. *Flosculi disci* numerosi, hermaphroditi; corolla flava lobis 5, pilis dispersis glandulis biseratis. *Stamina* 5; antherae ecaudatae connectivo vel non vel vix microsporangio longiore: contextus endothecii radiale incrassatus. *Styli* brachia conspicua, plus minusve oblonga. *Cypselae* homomorphae, lateraliter compressae tenues, quasi obovatae, stramineae, marginibus aliformibus atque fructu interdum discoloribus; apex incisurus; pericarpus aliquot fascibus vascularibus in extensioribus aliformibus, canalibus secretoriis nullis. *Pappus* minutus.

Typus: *Pembertonia latisquamea* (F.Muell.) P.S.Short.

Perennial, sprawling or scandent, glabrous shrub. *Leaves* alternate, entire, commonly linear, linear-oblanceolate or linear-elliptic but often somewhat curved, green, slightly succulent. *Capitula* solitary, radiate, heterogamous; involucral bracts in 2 rows, overlapping, herbaceous, the outer c. 5 bracts markedly convex and shorter than those of the inner row, the inner bracts flat to convex, all bracts glabrous and with *c.* 4–8 veins from the base. *Receptacle* convex, naked, glabrous. *Ray florets* female. *Corolla* usually white or pink, rarely somewhat mauve or purplish; tubular part with biseriate glandular hairs; ligule with 4–9 veins, with 2 or 3 indistinct lobes. *Disc florets* numerous, bisexual, 5-lobed, yellow, externally with scattered biseriate glandular hairs. *Stamens* 5; anthers not tailed, the connective not or barely exceeding the microsporangium; endothecial tissue with radial thickening; filament collar straight in outline and basally not thicker than the filament. *Style arms* conspicuous, more or less oblong. *Cypselas* homomorphic, laterally compressed and thin, symmetrical or slightly asymmetrical but essentially obovate in outline, pale brown, the wing-like margins and fruit body sometimes slightly discolorous; apically notched; basally with a region of smaller cells concolorous with the rest of the fruit; pericarp with several vascular bundles in each of the wing-like extensions, secretory canals absent. *Pappus* an uneven rim c. 0.1 mm high. *Chromosome number*: $n = 9$.

Distribution: A monotypic genus confined to Western Australia.

Etymology: The generic name commemorates Pemberton Walcott who joined Francis Gregory's expedition to the north-west coast of Australia in 1861 "as a volunteer for the collection of specimens of natural history and botany" (Gregory 1884, p. 53).

Nomenclature: Mueller, when describing and naming the species *Brachyscome latisquamea*, referred it to a new section, sect. *Heteropholis* F.Muell., placing this name in brackets under the binomial and then proceeding to give a description of the plant. The description is in two parts, the upper part with the more diagnostic features, distribution and collection data and the lower being a more detailed description. However, Mueller commonly compiled his species descriptions in this manner throughout the volumes of the *Fragmenta* and thus I believe it erroneous to treat the first part of the description as a diagnosis of the Sectional name. For this reason, following Article 41.2, I regard the sectional name to be invalid as a separate description or diagnosis was not provided.

Notes: At the interface of the corolla tube with the cypsela there is a minute and uneven rim of cells which Davis (1948, p. 229) considered to be a pappus. It is also described as a pappus in the above description but whether it is equivalent to the pappus

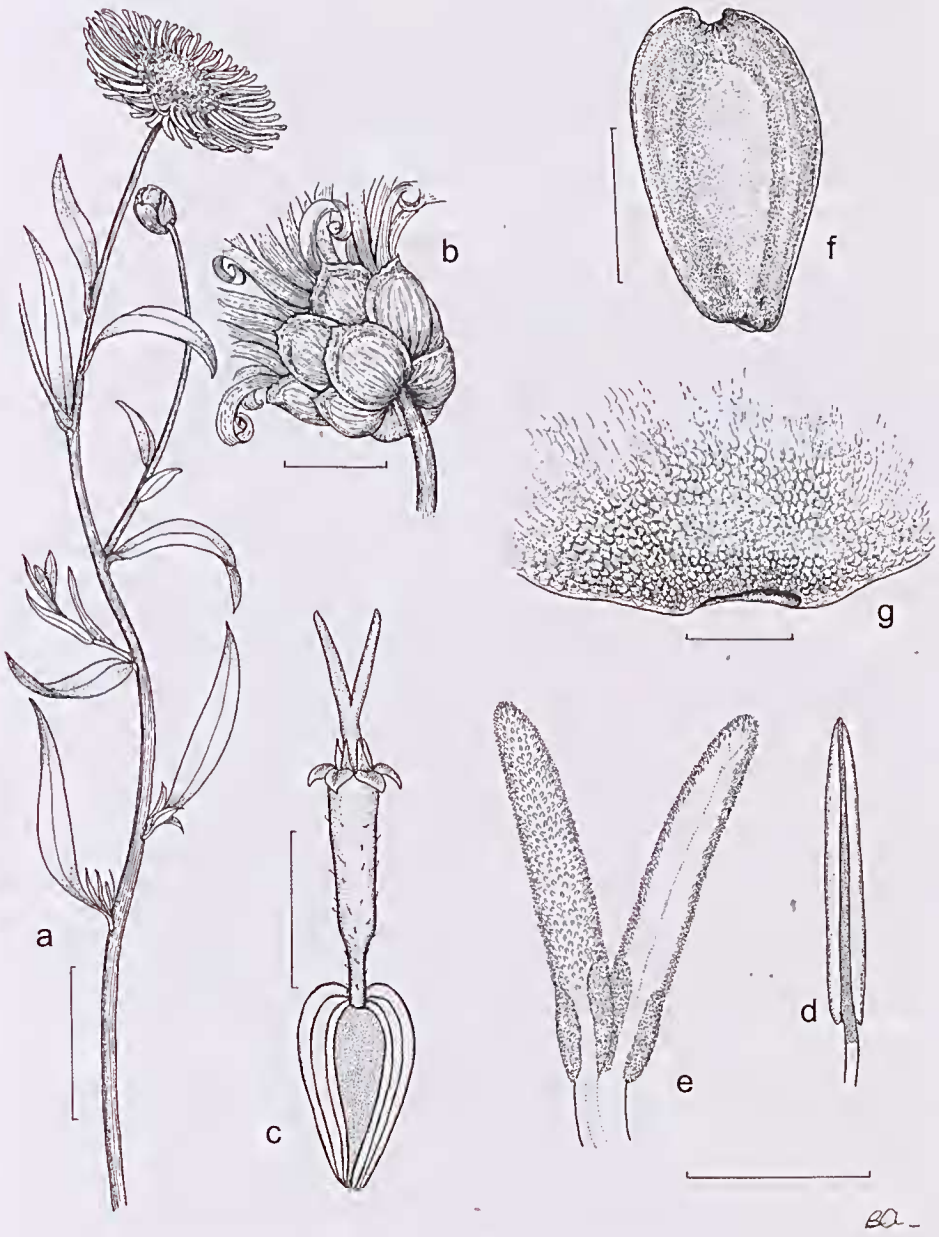

Figure 3. *Pembertonia latisquamea*. **a.** flowering branch (*Short 2503*); **b.** capitulum, showing two rows of involucral bracts (*Short 2470*); **c.** disc floret with vascular traces visible in the pericarp of the immature ovary (*Short 2470*); **d.** anther, showing virtual lack of an apical appendage (*Short 2470*); **e.** style arms from disc floret showing stigmatic part and the almost oblong appendages (*Short 2470*); **f.** mature cypsela (*Short 2054*); **g.** base of mature cypsela (*Short 2054*). Scale bars: a = 3 cm; b = 10 mm; c = 3 mm; d, e = 1 mm; f = 2 mm; g = 0.3 mm.

of other species of asteroid daisy is not clear to me. It may be that the cells of this "pappus" should be considered as part of the cypsela or part of the dehiscent tissue of the cypsela-corolla interface.

The cypsela morphology alone distinguishes this species from all others in *Brachyscome s. lat.* and indeed from other members of the Australian Astereae and, as far as I am aware, from non-Australian species. No other species has large, flattened, glabrous fruit with multiple vascular strands in the pericarp.

Pembertonia latisquamea (F.Muell.) P.S.Short, *comb. nov.* *Brachyscome latisquamea* F.Muell., *Fragm.* 11: 16 (Mar. 1878). Type citation: "Ad sinum marinum Shark-Bay in locis tempore pluviali humidis; F.M. Prope Champion-Bay, C. Gray." Lectotype (Davis 1948, p. 228, fig. 110): Shark Bay, [Oct. or Nov. 1877], *F. Mueller s.n.* (MEL 239618, *p.p.*). Isolectotypes: MEL 239618 *p.p.*, excluding lectotype. Remaining syntype: Champion Bay, *Charles Gray 67* (MEL 239619).

Perennial, sprawling or scandent and to c. 1.5 m tall shrub, glabrous. *Leaves* alternate, entire, linear, linear-oblanceolate or linear-elliptic but often somewhat curved, 10–80 mm long, 1–13 mm wide, green, slightly succulent. *Capitula* c. 14–18 mm diam. *Capitular bracts* c. 12–16, in about 2 rows, overlapping, obovate to widely obovate, 9–12 mm long, 3.5–8.5 mm wide, herbaceous, with the outer c. 5 bracts markedly convex and shorter than those of the inner row, the inner bracts flat to convex, all bracts glabrous, often slightly succulent, with *c.* 4–8 veins from the base. *Receptacle* convex, naked, glabrous, with rounded bumps indicating the position of the florets when fresh but appearing slightly pitted when dry. *Ray florets* 35–50. *Ray corolla* 22–37 mm long, 2.7–3.7 mm wide, commonly white or shades of pink, more rarely somewhat mauve or purplish; tubular part with biseriate glandular hairs; veins 4–9; apex not or barely 2 or 3-lobed. *Disc florets* c. 170–260, corolla tube 4.3–6 mm long, yellow, externally with scattered biseriate glandular hairs 0.5–1.2 mm long. *Stamens* 5; anthers with the microsporangium 1.65–2.25 mm long, apically rounded with the connective not or barely exceeding the microsporangium; endothecial tissue with radial thickening; filament collar straight in outline and basally not thicker than the filament. *Pollen grains* c. 5000–10000 per floret. *Style* 6.2–8.2 mm long; *arms* 1.8–2.8 mm long; appendages more or less oblong, 1.75–1.9 mm long.; stigmatic surface 0.6–0.7 mm long. *Cypselas* homomorphic, strongly laterally compressed and thin, symmetrical or slightly asymmetrical but essentially obovate in outline, 3–3.9 mm long, 1.6–2.8 mm wide, pale brown, the wing-like margins and fruit body not or slightly discolorous; apically notched; basally with a region of smaller cells concolorous with the rest of the fruit; pericarp with several vascular bundles in each wing-like extension, secretory canals absent. *Pappus* an uneven rim c. 0.1 mm high. *Chromosome number*: $n = 9$. (Fig. 3).

Distribution: Extends from approximately the Shark Bay region (including Dirk Hartog Island) to North West Cape, Western Australia and not recorded more than c. 50 km from the coast.

Habitat: Common in calcareous sand along the coast and associated with species such as *Spinifex hirsutus* Labill. but further inland in *Acacia* shrubland and *Atriplex* shrubland on red-brown sand.

Flowering Period & Reproductive Biology: The large capitula indicate that the species predominately cross-pollinates and this is supported by an average pollen:ovule ratio of 7021 determined from five capitula of *Short 2470*. The high value also suggests that the species is self-incompatible.

Collection data indicate that *P. latisquamea* commonly flowers between late July and the end of October but a flowering specimen (*A.S. George 2527*) from North West Cape was collected in early June and at Carnarvon flowering material has been collected in December (*W.V. Fitzgerald s.n.*, Dec. 1906).

Cytology: Turner (1970) recorded a chromosome number of n = c. 9 for this species. That the number is indeed n = 9 was subsequently determined by Carter (1978) and Watanabe *et al.* (1996). All populations examined for chromosome number determinations were gathered near Carnarvon and Pt Quobba.

Selected Specimens: WESTERN AUSTRALIA: 15.2 km N of Ningaloo homestead, 30 July 1980, *K.F. Kenneally 7354* (CANB, PERTH); Pt Quobba, 14 Oct. 1983, *P.S. Short 2054* (AD, MEL, PERTH); 2 km from Monkey Mia along road to Denham, 16 Aug. 1986, *P.S. Short 2470* (MEL, PERTH); 2 km E of Miaboola Beach, 9 Sept. 1976, *R. Story 8227* (CANB, PERTH); Exmouth, 5 Oct. 1975, *J.Z. Weber 4993* (AD, PERTH).

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References

Bentham, G. (1867). '*Brachycome*'. *Flora australiensis* **3**: 508–521. Reeve: London.

Brummitt, R.K. (2002). How to chop up a tree. *Taxon* **51**: 31–41.

Carter, C.R. (1978). The cytology of *Brachycome*. II. The subgenus *Metabrachycome*: a general survey. *Australian Journal of Botany* **26**: 699–706.

Davis, G. L. (1948). Revision of the genus *Brachycome* Cass. Part. I. Australian species. *Proceedings of the Linnaean Society of New South Wales* **73**: 142–241.

Denda, T., Watanabe, K., Kosuge, K., Yahara, T. & Ito, M. (1999). Molecular phylogeny in *Brachyscome* Cass. (Asteraceae, Astereae). *Plant Systematics and Evolution* **217**: 299–311.

Gregory, F.T. (1884). *Journals of Australian Explorations*. Govt. Printer: Brisbane.

Lockwood, K. (1995). *Big Jolly: the extraordinary adventures of John McKinlay, 1819–1872*. State Library of Victoria: Melbourne.

Short, P.S. (1999). '*Brachyscome*', in N.G. Walsh and T.J. Entwisle (eds), *Flora of Victoria* **4**: 835–859. Inkata Press: Melbourne.

Smith-White, S., Carter, C.R. and Stace, H.M. (1970). The cytology of *Brachycome*. I. The subgenus *Eubrachycome*: a general survey. *Australian Journal of Botany* **18**: 99–125.

Turner, B.L. (1970). Chromosome numbers in the Compositae. xii. Australian species. *American Journal of Botany* **57**: 382–389.

Watanabe, K., Denda, T., Suzuki, Y., Kosuge, K, Ito, M., Short, P.S. and Yahara, T. (1996). 'Chromosomal and molecular evolution in the genus *Brachyscome* (Astereae)', in D.J.N. Hind and H.J. Beentje (eds). *Compositae: systematics. Proceedings of the International Compositae Conference, Kew, 1994* **1**: 705–722. Royal Botanic Gardens, Kew.

Watanabe, K., Short, P.S., Denda, T., Suzuki, T., Ito, M., Yahara, T. and Kosuge, K (1996). Chromosome number determinations in the Australian Astereae (Asteraceae). *Muelleria* **9**: 197–228.

Willis, J.H. (1949). Botanical pioneers in Victoria. *Victorian Naturalist* **66**: 83–89, 103–109, 123–128.